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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Industrial Application]This invention relates to the plastic-molding parts of the shape of a disk of which accuracy severe to the deviation from circular form of a peripheral face or inner skin is required like the gear, a belt pulley, and a rag wheel.

[0002]

[Description of the Prior Art]In manufacturing this kind of forming parts by injection molding, two or more gates are arranged in the position on the center-of-a-circle circle of forming parts at abbreviation regular intervals, and it pours in the charge of a melting material into a cavity. In that case, since the heat shrinkage rate of the flow direction of material differs from the heat shrinkage rate of the direction which goes to a flow direct, it is very difficult to obtain the dimensional accuracy of forming parts, especially the accuracy in a peripheral part.

[0003]On the other hand, it is known that the shrinkage amount in such forming parts will become large in a field thicker than a thick thin field. Paying attention to this point, that with which the demerit produced according to the difference of contraction as mentioned above was compensated is indicated by JP,4-238008,A. That is, according to the description content, since the outside dimension passing through between two gate marks which usually adjoin to the outside dimension from the axial center passing through a gate mark becomes small, it is going to secure deviation from circular form by thickening thickness of the path field passing through a gate mark.

[0004]Such deviation from circular form is greatly influenced also with the material of a plastic. Since the additive of a fiber is made to mix like glass or carbon fiber in many cases in order to obtain rigidity and elasticity in the gear etc., but the charge of a melting material poured in into a cavity spreads centering on the gate, Between gates, the unification line (weld line) of the gate number and the same number is formed in a diameter direction. therefore -- orientation of

the additive being carried out along a unification line in a unification line area, and setting to other fields -- abbreviated -- orientation is carried out in the direction which intersects perpendicularly with it. Therefore, it will \*\*\*\* to such a stacking tendency, the degrees of contraction in each angular position will differ, and it becomes difficult to obtain the deviation from circular form of a peripheral part. In order to cancel such a point, it is considered as the shape which connected the outer ring part and the inner ring part with two or more radiate ribs, and the thing from which it was made for a gate location to become every other one between these ribs is indicated by JP,2-44701,B.

[0005]And although the problem of such deviation from circular form is remarkable in the rim of a peripheral part, it poses a problem to some extent also about the boss of an inner periphery.  
[0006]

[Problem(s) to be Solved by the Invention]The cause by which deviation from circular form is no longer obtained since distribution of contraction differs so that the above-mentioned explanation may also show is in how to flow through the charge of a melting material in a cavity. Although what is necessary is just to make it this charge of a melting material flow in the direction of 360 degrees from an axial center if it is original, in the forming parts which form a boss, it is unreasonableness on parenchyma. Therefore, although two or more gates will be arranged to a disc face like the usually above-mentioned conventional example, if they are provided in the position close to a boss, the injection time into a cavity will become long and, moreover, temperature controlling in the meantime will become difficult. When between gates becomes narrow, processing of a metallic mold also becomes difficult.

[0007]Therefore, although it is possible to the abbreviated mid-position of a rim and a boss to arrange a gate in large numbers moreover to circumference shape, Also in this case, by providing between gates in large numbers narrowly, (1) The temperature of the side which provided the gate at the time of material pouring becomes remarkably high (the temperature of the charge of a melting material is about 200 \*\*), Problems, like the working manhour on (3) metallic-mold creation to which a temperature gradient with an opposite hand becomes large, and the utilization efficiency of material worsens since (2) runners who produce a differential shrinkage at the time of cooling increase in number increases arise.

[0008]this invention is made in view of such a problem, and comes out. It is providing the plastic-molding parts of the shape of a disk in which the deviation from circular form which can pass the charge of a melting material on the average to inner and an outer peripheral direction, and can manufacture it from the circumference position between a rim and a boss to it exceeded, without increasing the purpose especially.

[0009]

[Means for Solving the Problem]In order to attain the above-mentioned purpose, plastic-

molding parts of the shape of a disk in this invention, A boss is formed in an inner periphery of a disk, and a rim is formed in a peripheral part, Between this boss and this rim, circular ribs thick to concentric circle shape are formed, and it is fabricated by pouring in a charge of a melting material from two or more gates from a direction which intersects perpendicularly with a field of this disk in the interval angular positions, such as the abbreviation for these circular ribs.

[0010]Plastic-molding parts of the shape of a disk [ in / preferably / this invention ], Between this rim and these circular ribs and/or between these circular ribs and this boss, A thick part is formed in concentric circle shape, thickness between this thick part and these circular ribs is thin in a diameter direction position passing through an injecting position from this gate, and it is formed so that it may become thick in a diameter direction position approximately middle [ between injecting positions from this gate ], and it may change to a circumferencial direction gradually.

[0011]

[Function]Although the charge of a melting material poured into circumference shape from two or more gates arranged at equal intervals flows from an injecting position into the cavity of a metallic mold also to a diameter direction, the part flows through them into the diameter direction gradually in the process, the many flowing into a circumferencial direction along with circular ribs. The material which is poured in from the gate which adjoins soon and has flowed is joined, and the material which was flowing along with circular ribs also comes to flow into a diameter direction. Thus, all the charges of a melting material are passed on the average in the outer peripheral direction and the direction of inner circumference from circular ribs. Therefore, the plastic-molding parts of the shape of a disk in which distribution of contraction was also equalized and deviation from circular form exceeded are obtained.

[0012]However, even if it does in this way, there is a tendency for the quantity which flows into a diameter direction to increase generally depending on how to put the degree of melting of material and a pressure moreover compared with the quantity which flows between injecting positions to a diameter direction from an injecting position. Therefore, so that the thickness of the diameter direction part of an injecting position may become thin most and the thickness of the diameter direction part between injecting positions may become the thickest depending on the kind and precision prescribe of material, By making the thickness of a diameter direction change gradually, it becomes possible to equalize a flow still better, and the plastic-molding parts of the shape of a disk with highly precise deviation from circular form are obtained.

[0013]

[Example]

Drawing 1 thru/or drawing 3 explain the 1st example of 1st example this invention. Drawing 1 is a top view of the gear, drawing 2 is an A-A line sectional view of drawing 1, and drawing 3 is

a B-B line sectional view of drawing 1.

[0014]The tooth part 1a is formed in the rim 1 of a peripheral part, and, as for the gear of the shape of a disk currently illustrated, tooth part 2b is formed in the boss 2 of an inner periphery. They and the same mind circular ribs 3 are formed in the abbreviated mid-position of the rim 1 and the boss 2, and it has the five gate marks 3a as shown in drawing 1. Between the rim 1 and the circular ribs 3, the thick part 4 is formed in same mind with them, and the thick part 5 is formed in [ it is same and ] same mind between the boss 2 and the circular ribs 3. These thick parts 4 and 5 also have the function as circular ribs so that it may understand also by a diagram. And the diameter of the five radiation ribs 6 is carried out to these circular ribs 3 and the thick parts 4 and 5.

[0015]No thickness of the crevice 7 between the circular ribs 3 and the thick part 4 and the crevice 8 between the circular ribs 3 and the thick part 5 is constant. The thickness of the crevice 7 is made most thickly [ it is the thinnest and ] in the position of the diameter direction passing through the gate mark 3a in a diameter direction position middle [ between gate marks ] so that it may understand by drawing 3.

It is formed so that it may change to a hoop direction gradually.

Although not illustrated, the thickness of the crevice 8 is formed similarly. The runner 9 by whom the gate is established in the tip part, and the dowel pin 10 which releases the gear from mold are shown in drawing 2 as everyone knows.

[0016]Next, the flow of the charge of a melting material at the time of shaping is explained with reference to drawing 1. Into the cavity of a metallic mold, the poured-in charge of a melting material flows from five gates on all sides. Although it flows also into a diameter direction from an injecting position (gate mark 3a) at this time, since the thickness of the crevices 7 and 8 of a diameter direction position is thin, those many flow into a circumferential direction along with the circular ribs 3. The material which flowed along with these circular ribs 3 also flows also into the diameter direction in that process. Although the thickness of the crevices 7 and 8 is becoming thick gradually, since a pressure also falls gradually, such a difference is not produced in the quantity which flows into a diameter direction by each angular position.

[0017]The material which was flowing along with the circumference rib 3 also joins the material which has flowed from the gate which adjoined soon, and flows through the radiation rib 6 into a diameter direction. Thus, the material which has flowed through the material and the radiation rib 6 which have flowed through the crevices 7 and 8 flows into the thick parts 4 and 5 of a circle configuration. Even if the strength of the flow to a diameter direction has some variations, the variation is eased here, it flows into all the diameter directions by a pressure with an equivalent abbreviation, and the rim 1 and the boss 2 are formed.

[0018]Thus, the charge of a melting material poured in from five gates, Will be in the state where it passed radiately from the circular ribs 3, and as if \*\* was also poured in from the

countless gate arranged at circumference shape in being insufficient, change into the state where it should be satisfied in the thick parts 4 and 5 -- a peripheral part and an inner periphery -- all the angular positions -- abbreviated -- linear -- moreover -- a pressure -- approximately regulated -- it-izing and passes.

[0019]Drawing 4 thru/or drawing 6 explain the 2nd example of 2nd example this invention. Drawing 4 is a top view of the gear, drawing 5 is a C-C line sectional view of drawing 4, and drawing 6 is a D-D line sectional view of drawing 4. The same numerals are attached to the same portion as the case of the 1st example.

[0020]This example loses the five radiation ribs 6 in the 1st example, and loses the tooth part 2a currently formed in the boss 2. Thus, if there is no problem in the intensity of the gear, a radiation rib is omissible, but by it, naturally, since how from the circular ribs 3 to a radial direction to flow changes, when the shape of the circular ribs 3 thinks that it is the same, the necessity of changing the thick shape in the crevices 7 and 8 comes out.

[0021]It is not a best policy to change the thickness of the thick parts 4 and 5 like the crevice 7 in drawing 6 for adjustment of a flow direction. Although many things were tried experimentally, the adjustment effect with repetitiousness was not acquired. However, when these thick parts 4 and 5 are formed conversely, the clearly good result is obtained the case [ for ] where it does not form. Therefore, as explanation of the 1st example also described, it has a relaxation effect of variation and this is being able to say about all the examples of this invention.

[0022]Drawing 7 thru/or drawing 9 explain the 3rd example of 3rd example this invention. Drawing 7 is a top view of the gear, drawing 8 is an E-E line sectional view of drawing 7, and drawing 9 is a F-F line sectional view of drawing 7. The same numerals are attached to the portion the same as the case of the 2nd example, or equivalent.

[0023]This example forms the thick parts 4 successively to the rim 1 in the 2nd example, and forms the thick parts 5 successively to the boss 2. Even when constituted in this way, the case of the 2nd example and the effect of an abbreviated EQC are acquired.

[0024]Also in the case of this example, are changing the thickness of the crevices 7 and 8 gradually so that it may be thin and may become thick in the diameter direction of the injecting position of material like the 1st example and the 2nd example in the diameter direction of the mid-position between injecting positions, but. Depending on the material or the precision prescribe which are used, change may not be given in this way, but it may be good also as the almost same thickness. This is being able to say also to all the examples of this invention. In this example, even if it forms the radiation rib 6 like the 1st example, it does not interfere.

[0025]Drawing 10 and drawing 11 explain the 4th example of 4th example this invention. Drawing 10 is a top view of the gear and drawing 11 is a G-G line sectional view of drawing 10.

[0026]This example makes the outer peripheral direction of the circular ribs 3 the same shape

as the 3rd example, and makes the direction of inner circumference of the circular ribs 3 the same shape as the 2nd example. Even when constituted in this way, the same above-mentioned effect as each example and abbreviation is acquired. Of course, the outer peripheral direction of the circular ribs 3 is made into the same shape as the 2nd example, and even if it makes the direction of inner circumference of the circular ribs 3 into the same shape as the 3rd example, it does not interfere. It does not interfere, even if it forms the radiation rib 6 like the 1st example.

[0027]In each of above-mentioned examples, although what is necessary is just to choose a suitable number according to the diameter dimension of forming parts, etc. although each was considered as the gate number with five pieces and, as for the circular ribs 3, sectional shape is carrying out the rectangle, it is also possible to make this into proper shape, such as an ellipse form. Although the rim 1 may differ in the precision prescribe over deviation from circular form from the boss 2, as long as there is no problem of intensity in that case, the thick part 5 may be omitted, for example. In this invention, although it is important to make it flow through the charge of a melting material into a diameter direction on the average and the minimum circular ribs 3 are required for that purpose, when extreme, the case where the thick parts 4 and 5 may be omitted can be considered. This invention is applicable not only to the gear but all the plastic-molding parts of which accuracy severe to the deviation from circular form of a peripheral part or an inner periphery is required like a belt pulley and a rag wheel.

[0028]

[Effect of the Invention]As mentioned above, the plastic-molding parts of the shape of a disk in this invention, Since the charge of a melting material can be passed on the average to inner and an outer peripheral direction and can be manufactured from the circumference position between a rim and a boss to it, without increasing the gate number especially at the time of shaping, it is possible to secure the deviation from circular form according to a precision prescribe regardless of the degree of contraction of material.

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[Translation done.]

JAPANESE

[JP,08-025501,A]

CLAIMS DETAILED DESCRIPTION TECHNICAL FIELD PRIOR ART EFFECT OF THE INVENTION TECHNICAL PROBLEM MEANS OPERATION EXAMPLE DESCRIPTION OF DRAWINGS DRAWINGS

[Translation done.]

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## DRAWINGS

[Drawing 3]



[Drawing 6]

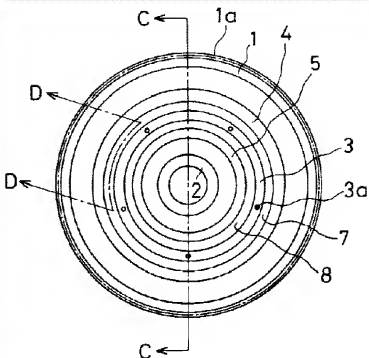


[Drawing 9]

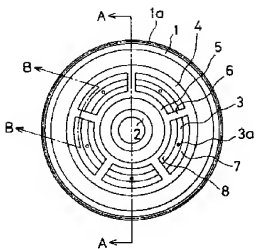


[Drawing 1]

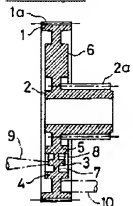
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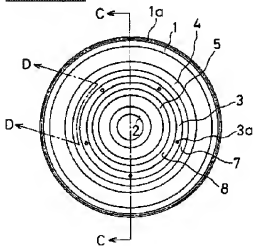
[Translation done.]



[Drawing 2]

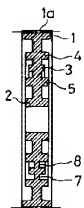


[Drawing 4]

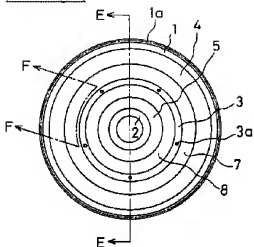


[Drawing 5]

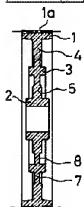




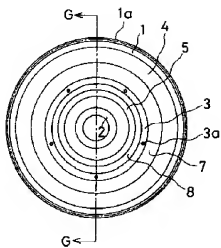
[Drawing 7]



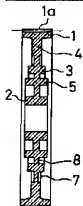
[Drawing 8]



[Drawing 10]



[Drawing 11]



[Translation done.]

MENU

SEARCH

INDEX

DETAIL

JAPANESE

LEGAL  
STATUS

1 / 1

## PATENT ABSTRACTS OF JAPAN

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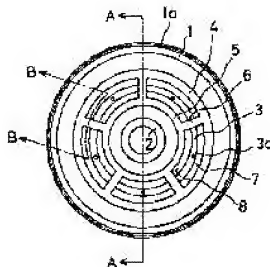
(51)Int.Cl. **B29D 15/00**  
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(21)Application number : **06-162254** (71) **ENPLAS CORP**  
 Applicant :  
 (22)Date of filing : **14.07.1994** (72)Inventor : **SAKAMAKI KAZUYUKI**

**(54) DISKLIKE PLASTIC MOLDING****(57)Abstract:**

**PURPOSE:** To obtain a molding which is excellent in roundness by making a molten material flow uniformly in the inner and outer peripheral directions by a method wherein a circular rib is formed between a boss of the inner peripheral part of a disk and a rim of the outer peripheral part of the disk, and the molten material is casted from a plurality of gates crossing a surface of the disk at right angles to be molded into a molded component.

**CONSTITUTION:** A molten material casted from five gates flows in every directions in a cavity of a mold. At that time, through it flows also in a backward direction from a casting position, since wall thickness of recess parts 7, 8 at radial positions are thin, most of the molten material flows circumferentially along a circular rib 3. The material having flowed along the rib 3 flows also radially in that process. The





material having flowed along the rib 3 also joins the material having flowed from an adjacent gate, and flows radially along a radial rib 6. The material having flowed through the recess parts 7, 8, and the radial rib 6 flows into circular wall thick parts 4, 5. Through strength of the radial flow fluctuates slightly, the fluctuation is softened herein. The material flows under almost uniform pressure in all radial directions to mold a rim 1 and a boss 2.